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C. William Beebe; 'Mocking-bird Notes,' by Lucy Gould Baldwin; 'A New Device for Securing Bird's Pictures,' by Frank M. Chapman; 'Bird Life in the Klondike,' by Tappan Adney, and a poem 'On Hearing a Winter Wren Sing in Winter,' by Lynn Ten Sprague. 'Birds and Seasons' now gives place to 'How to Name the Birds,' studies of the families of Passeres, by Frank M. Chapman, the first of a series of papers on identification. In the Department for Young Observers, E. W. Sinnott tells of 'My Bird Restaurant,' while many notes and reviews and an account of the New York meeting of the American Ornithologists' Union complete a large and well-illustrated number. The frontispiece of a ptarmigan on its nest deserves particular mention as a fine example of protective coloration.

The Museums Journal of Great Britain contains a brief but suggestive article by F. W. Rudder 'On the Registration of Type Specimens by Local Scientific Societies,' showing the desirability of having published records of types in the possession of societies or individuals. E. M. Holmes contributes a paper 'On the Arranging and Indexing of Scientific Pamphlets in Museum Libraries,' a subject which has been pretty well worked out in the United States. D. P. H. discusses 'Hygiene as a Subject for Museum Illustration' and there are a large number of notes from many museums in various parts of the world.

SOCIETIES AND ACADEMIES.

CALENDAR.

The American Association for the Advancement of Science. A meeting of the council will be held at the Quadrangle Club, University of Chicago, on the afternoon of January 1. Section H (Anthropology) will meet in the Field Columbian Museum, Chicago (December 31 and January 1 and 2). The next regular meeting of the Association will be held at Pittsburg, Pa. (June 28 to July 3). A winter meeting is planned to be held at Washington during the convocation week of 1902-3.

The American Society of Naturalists will hold its annual meeting at the University of Chicago (December 31 and January 1). In conjunction with it will meet the Naturalists of the Central States and several affiliated societies, including the American Morphological Society (beginning on January 1); The American Physiological Society (December 30 and 31);

The American Psychological Association and the Western Philosophical Association (December 31 and January 1 and 2); The Society of American Bacteriologists (December 31 and January 1), and The American Association of Anatomists (December 31 and January 1 and 2).

The Astronomical and Astrophysical Society of America will meet in Washington (beginning on December 30).

The Geological Society of America will meet at Rochester, N. Y. (December 31 and January 1 and 2).

The American Chemical Society will meet at the University of Pennsylvania, Philadelphia (December 30 and 31).

The Society for Plant Morphology and Physiology will hold its fifth annual meeting at Columbia University, New York City (December 31 and January 1 and 2).

WINTER MEETING OF SECTION H, ANTHROPOLOGY, OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE Secretary has received the following titles of papers for presentation at the meeting to be held in Chicago, December 31, 1901, and January 1-2, 1902:

'The Beginnings of Anthropology': W. J. MCGEE.

'Twenty Years of Section H': GEORGE GRANT MACCURDY.

'The Exhibit of Hopi Ceremonies in the Field Columbian Museum': GEORGE A. DORSEY.

'On Some Painted Stone Slabs from the Graves of the Ruins of Walpi': C. L. OWEN.

'Basketry Designs in Northern California': ROLAND B. DIXON.

'Pueblo Indian Settlements near El Paso, Texas': J. WALTER FEWKES.

'Field Work in Arizona, 1901': WALTER HOUGH.

'The Anthropological Work of the Hyde Expedition': ALES HEDLICKA.

'Some Observations concerning the Navaho Blanket Industry': FRANK RUSSELL.

'Certain Forms of Winged-Perforated Slate Objects': WARREN K. MOOREHEAD.

'The Variability of Anthropometric Types': FRANZ BOAS.

'A Voice Tonometer': C. E. SEASHORE.

'The Psychological Elements of Visual Space Orientation About a Horizontal Axis': ROBERT MACDOUGALL.

'The Sherman Anthropological Collection, Holyoke, Mass.': GEORGE GRANT MACCURDY.

'The Significance of the Cross': PAUL CARUS.

SECTION OF ANTHROPOLOGY AND PSYCHOLOGY
OF THE NEW YORK ACADEMY OF SCIENCES.

A MEETING was held on November 25, with Professor Farrand occupying the chair.

Professor Robert MacDougall stated some of the conclusions of an investigation into the 'Combination of Simple Rhythm Groups in Higher Syntheses, and their Equivalences.' He has found that the simplest rhythmic units are always combined into larger groups, provided only the units succeed each other with sufficient rapidity. And these larger groups may be combined into others still larger—a process to which no definite limits can be set. The simplest group of rhythmic units is the pair or dipody, which appears in every rhythmic series that admits of such grouping. The means by which this coupling of the units is accomplished in poetry are: Subordination of the accent of one unit to the accent of the other, differentiation in the intervals, introduction of mid-line and final pauses, catalexis and rhyme. In any sort of rhythm that is objectively expressed, the first unit of a dipody receives the major accent, and also occupies more time than the second unit. Even in a long rhythmic series, there is properly no mere reduplication of units, but each unit fulfils a unique function in the series, in virtue of which it is differentiated from all the other units, in emphasis and duration and also in its internal configuration.

Professor Edward L. Thorndike spoke of some general aspects of the investigation which he is at present carrying on into the correlations amongst mental abilities. He found that regular correlation, where each degree of one function involves a similar degree of the other, is by no means the rule in the case of mental abilities. The relationships are often extremely irregular. For instance a high degree of one ability may go with a high degree of another but all other grades may involve no similarity in the other. A single coefficient of correlation in such cases is of course an absurdity. Correlations seem more marked between complex than between simple abilities. A variation of the Pearson method was outlined, which is well adapted to work with mental correlations and especially with studies involving few cases.

As samples of his results, Dr. Thorndike demonstrated the absence of correlation between certain motor and mental tests, the pronounced correlation between ability to spell and ability to notice the structure of words, the pronounced correlations between school marks in different subjects and the lesser degrees of correlation in the case of objective tests in the same subjects.

Mr. J. Franklin Messenger outlined an 'Experimental Study of Number Perception.' His experiments had reference to the so-called space threshold in tactile sensations, to the fusion of touch sensations, and to the perception of number through touch. The validity of a threshold determined only by the distance apart of the two points applied to the skin was denied, because distance is only one of the elements on which the perception is based, and often not the most important element. The fusion of two tactile sensations was also denied because of such facts as the following, that two points, *one on each hand*, may be perceived as one point when the hands are close together.

The speaker offered a theory of the tactile perception of number. Number is not directly sensed by touch, but is inferred from various peculiarities of the tactile sensation, such as the geometrical arrangement of the stimulating objects, the distance apart of these objects, the contour of the surface stimulated—and also from the preceding sensation and the attitude of the subject.

R. S. WOODWORTH,
Secretary.

TORREY BOTANICAL CLUB.

AT a meeting of the Club at the College of Pharmacy on October 30, the scientific program was opened by a paper by Dr. D. T. MacDougal, entitled, 'Some Characters of Alpine Vegetation.' The paper was illustrated with numerous sheets of mountain plants from Montana, many of them with attached photographs showing the habitat. In the Missoula region where Dr. MacDougal was working this summer, the growing season for many plants was about 40 days only, but the actual light reaching the plants may have been 30 to 40 per cent. greater than at sea level, and with a larger

proportion of blue rays. These mountain tops may be among the driest places on the continent or may contain swamp pockets. There is no distinct type of Alpine vegetation as such; but Alpine plants are really xerophytes, being such plants as have adapted themselves to an insufficient water supply.

Our Alpine plants are often thought to be identical with polar plants. But the polar plant receives light continuously through a long period, though the light is of little intensity. The polar plant has an atmosphere of much greater humidity, but a much colder soil. Polar plants develop much greater thickness of leaf. Alpine plants abound in more numerous protective devices, as waxy coatings, hair, thicker stems, and modes of propagation without seeds. *Poa alpina*, for example, in many mountain regions is never known to flower.

Remarks followed regarding the viviparous state of *Poa alpina*, Dr. Rydberg observing its abundance in Greenland and Spitzbergen, and Miss Isaacs remarking on her collecting it at 7,500 feet altitude during the last summer in Switzerland.

Dr. Underwood called attention to the relative amount of sunlight in tropical and in northern regions, showing that the amount of light is much greater north of the tropics, though more oblique.

Discussion followed regarding relations of moisture. Dr. Schoeney referred to the peculiar erect and densely appressed stems assumed by a cespitose *Opuntia* about Boulder, Colorado. Dr. MacDougal spoke of the remarkable degree to which many of the *Cacti* have adapted themselves to xerophytic conditions, so that they lose water less than $\frac{1}{100}$ as readily as in ordinary plant structures in similar positions.

Dr. Rydberg referred to the permanent moisture found within ten or twelve inches of the surface in the dry sand hills of Nebraska.

The second paper was by Dr. P. A. Rydberg, 'Revisions of *Limnorchis*,' being a study now printing in the *Bulletin*, treating of the former genus *Habenaria* and of segregations accepted from it, including the new genera *Limnorchis*, the green and swamp orchids of the Eastern United States, *Piperia*, *Lysiella* and *Gymnadeniopsis*; and the revival of the genus *Blephari-*

glottis of Rahneseque. The first *Limnorchis* described was Koenig's '*Orchis hyperborea*,' often found in Iceland and Greenland, but rare in America, though sometimes occurring in the cold upper region of New York and Canada. Discussion of synonymy and illustration by numerous specimens accompanied the paper. The diagnostic characters were drawn from the spur, lip and stamens, 24 species of *Limnorchis* and 9 of *Piperia* being recognized.

Reference was made by Mr. G. H. Watson to a remarkable growth near Ellenville, New York, where two trees not only different in species, but in family had so twisted together as to become incorporated, and in response to remarks appreciating its significance, he promised further investigation and a photograph of the trees.

EDWARD S. BURGESS,
Secretary.

SCIENCE CLUB, UNIVERSITY OF WISCONSIN.

At the November meeting of the University of Wisconsin Science Club, Professor C. S. Schlichter presented a paper on 'A New Method of Determining the Size and Velocity of Underground Streams,' and A. H. Pfund discussed 'The Dispersion and Absorption of Selenium.'

During the past summer Professor Schlichter made preliminary tests, for the Hydrographic Division of the U. S. Geological Survey, of the movement of streams percolating through sands and gravels beneath rivers like the Arkansas and Platte, which, across the semi-arid plains in western Kansas and Nebraska, entirely disappear during the months of July and August. The method devised for these tests was an electrical one which permitted rapid and extensive surveys to be made at low expense. A double row of one and one-half inch drive wells was sunk across the channel of the river. The upstream wells were charged with a strong electrolyte, which dissolved and passed downstream with the underground water. When the chemical reached the lower wells its presence was shown by the deflection of a needle, and the rate of movement was then easily calculated. The underground flowage at the places tested was found to range from 3 to 15 feet per day, and to be fairly constant, not

varying more than 10 per cent. The gradient at such places is 8 to 10 feet per mile.

Professor Schlichter's paper was discussed by Professors C. R. Van Hise, J. B. Johnson, F. W. King, F. E. Turneure and E. A. Birge.

Mr. Pfund discussed the 'Dispersion and Absorption of Selenium.' By devising a new method for depositing films of the aniline dyes on glass and for photographing the interference fringes produced by a Michelson interferometer, the dispersion of amorphous selenium, a comparatively opaque substance, has been successfully studied. The refractive index of selenium rises with extraordinary rapidity until at the limit of the photographic field it reaches a value of 3.13, one of the very highest known. In general, the light-absorbing power of selenium lies between that of the aniline dyes and that of the metals. With a small concave grating, it has been found that selenium absorbs light more and more strongly as the end of the ultra-violet spectrum is approached, instead of there being a region of retransmission.

C. K. LEITH.

DISCUSSION AND CORRESPONDENCE.

THE MATHEMATICAL THEORY OF THE TOP, SIMPLIFIED.

TO THE EDITOR OF SCIENCE: Professor A. G. Greenhill has been good enough to show me his terse method of treating the top integrals. As this is a subject on which Professor Greenhill speaks authoritatively, and will interest a number of your readers, in particular his many friends in Sections A and B of the American Association, I suggest that it be published in SCIENCE.

CARL BARUS.

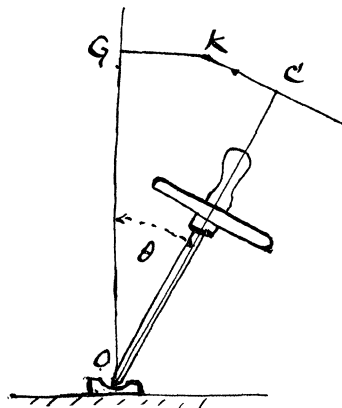
Brown University, Providence R. I.,
November 20, 1901.

Let the vector OH represent the resultant angular momentum of a symmetrical top; spinning about its point O is a small smooth fixed cup, as in the Maxwell top.

Since the axis Og of the torque of gravity is always horizontal H will describe a curve (a Poinset herpolhode), in a fixed horizontal plane at a height OG above O , the vertical vector OG representing the constant component G of angular momentum about the vertical.

We assume that the component G' of the angular momentum of the top about its axis OC remains constant, as there is nothing to alter it, if the top is symmetrical.

FIG. 1.



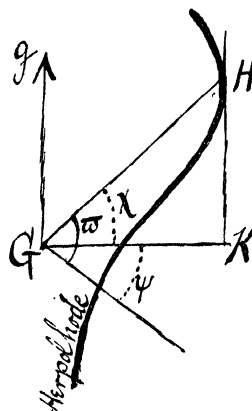
Expressed by Euler's angles θ and ψ the vector OH has the components (Figs. 1 and 2)

$$(1) \quad OC = G', \quad CK = A_1 \sin \vartheta \frac{dx}{dt}, \quad KH = A_1 \frac{d\vartheta}{dt},$$

A_1 denoting the moment of inertia of the top about an axis through O perpendicular to OC .

The velocity of H is equal to the torque of gravity $Wgh \sin \vartheta$, so that, denoting the polar

FIG. 2.



coordinates of H in the horizontal plane GHK by ρ and π , and resolving in the radial direction GH .

$$(2) \quad \frac{d\rho}{dt} = Wgh \sin \vartheta \cos GHK = Wgh \sin \vartheta \frac{KH}{\rho}$$